

Copyright is owned by the Author of the thesis. Permission is given for a copy to be downloaded by an individual for the purpose of research and private study only. The thesis may not be reproduced elsewhere without the permission of the Author.

**Impact of collaborative planning for mathematics and
anticipating student responses to problems on teacher
beliefs, knowledge and practice**

A thesis presented in partial fulfilment of the
requirements for the degree of
Master of Education
at Massey University, Palmerston North, New Zealand

Jenna Louise Crowley

2017

ABSTRACT

Six teachers engaged in collaborative planning for mathematics lessons that allowed for student-generated responses to problems. As part of their planning they anticipated a range of possible strategies students could use to solve problems and possible student misconceptions. This study explored how the teachers perceived these practices affected their beliefs and the teaching approaches they enacted in their lessons. The study also examined the affordances and barriers of collaborative planning and anticipating on teacher learning.

Mathematics education literature recommends a move toward student inquiry approaches in order to improve outcomes for all learners. Relevant literature was reviewed, illustrating the importance of providing the conditions required to enable teacher learning and change. Evidence was provided of the role of dissonance, teacher confidence and knowledge of both mathematics content and pedagogy, and effective leadership and systems of support. Teacher collaboration was identified as a potential catalyst for change.

A qualitative case study method was chosen as most appropriate for this study. A range of data was collected and analysed, including semi-structured interviews with all of the participants. Researcher field notes and documentary data allowed for triangulation. Ethical principals were strictly adhered to.

The study revealed some resistance to change and the constraints of teachers' prior learning and existing beliefs and practices on the outcomes of the collaborative planning intervention. The study demonstrated teachers' experimental approach to enacting new practices in mathematics lessons and their adherence to their current teaching practices and beliefs about grouping students for learning. Noteworthy benefits of anticipating and collaborative planning were increased teacher confidence to allow student-generated solutions to problems and increased teacher knowledge of mathematics strategies. These benefits were attributed to teachers learning from each other while collaboratively planning.

The results revealed teacher collaboration was perceived as an affordance to change and highlighted a number of factors which acted as barriers to teacher change. Identified barriers included either too much or too little dissonance experienced by teachers, attitudes towards risk and the desire to conform, and gaps in teacher knowledge of mathematics. The results offered insights into the effects of school culture and the design of professional learning experiences for teachers.

ACKNOWLEDGEMENTS

I would like to acknowledge and thank the many people who have made this study possible. Most importantly I wish to thank the teachers who participated in the study and acknowledge the value of their contributions to the study and to my own learning. I appreciate the time and effort that each of you put in and your willingness to share so openly with me.

I give acknowledgement and thanks to my supervisors, Dr Roberta Hunter, Dr Jodie Hunter, and Dr Glenda Anthony. You have all shown me patience, belief and support, both personally and professionally. Your suggestions and guidance have shaped the final presentation of this thesis. Bobbie, your contribution to my growth and personal development over the last twelve years has been invaluable, and will always be remembered.

Finally, I must acknowledge and thank my family and friends for coming on this journey alongside me. To my husband, Warren Snalam, who held everything together around me, I would like to say thank you for being my partner and my supporter. I want to thank my mother, father, and sister for their encouragement and unwavering belief in me. Lastly, I wish to express my sincere appreciation to my friend Becks, for her advice and input into my writing; and to Laurayne, who helped me get over the finish line. This study would not have been possible without any of the people mentioned here, and I acknowledge the collective effort that has gone into this thesis. Arohanui ki a koutou.

TABLE OF CONTENTS

ABSTRACT	ii
ACKNOWLEDGEMENTS	iii
TABLE OF CONTENTS	iv
CHAPTER 1: INTRODUCTION	
1.1 Background to the study	1
1.2 Research objectives	3
1.3 Overview	4
CHAPTER 2: LITERATURE REVIEW	
2.1 Introduction	5
2.2 Planning practices and the role of anticipation	5
2.3 Teacher change	6
2.3.1 Generative teacher change	7
2.3.2 Dissonance	7
2.3.3 Vision	8
2.3.4 New Knowledge	8
2.3.5 Relevance	9
2.3.6 Leadership	10
2.4 Professional learning communities	10
2.4.1 Culture of collaboration	10
2.4.2 Collective inquiry	11
2.4.3 Student learning	11
2.4.4 Action and results orientation	12
2.5 Teacher collaboration	12
2.5.1 Shared beliefs	13
2.5.2 Respectful challenge	13
2.5.3 Risk-taking and enquiry-mindedness	14
2.5.4 Facilitation	14
2.5.5 System-level support	15
2.5.6 Benefits of teacher collaboration	15
2.6 Teacher knowledge	16
2.7 Impact of teacher confidence and efficacy on teacher practice	17

2.8 Summary	17
CHAPTER 3: RESEARCH DESIGN	
3.1 Introduction	19
3.2 Methodology	19
3.3 Case study	20
3.4 Role of the researcher	21
3.5 Data collection	21
3.5.1 Interview	22
3.5.2 Observation	22
3.5.3 Documentary data	22
3.5.4 Setting and sample	23
3.5.5 Research schedule	24
3.5.6 Reliability and validity	25
3.6 Data analysis	26
3.7 Ethical considerations	27
3.8 Summary	28
CHAPTER 4: FINDINGS	
4.1 Introduction	30
4.2 Teachers' beliefs and prior learning	30
4.3 Teacher confidence and self-efficacy	33
4.3.1 Planning practices and the role of anticipation	33
4.3.2 Working as a team	34
4.3.3 Desire to conform	35
4.4 Teacher knowledge	36
4.4.1 Mathematics knowledge	38
4.4.2 Curriculum knowledge	38
4.5 Use of student responses	39
4.6 Teacher experimentation	41
4.7 Summary	42
CHAPTER 5: DISCUSSION AND CONCLUSION	
5.1 Introduction	44
5.2 Analysis of barriers to teacher change	44
5.2.1 Teacher beliefs and prior learning – The individual teacher	45

5.2.2	Teachers' prior learning and the role of dissonance	45
5.2.3	Teacher beliefs and critical inquiry	46
5.2.4	Perceived pressure on teachers – The school	47
5.2.5	School norms and collegial expectations	47
5.2.6	Perception of risk	48
5.2.7	Time pressure	49
5.2.8	Teacher experimentation – The learning activity	49
5.2.9	Teacher knowledge	50
5.3	Analysis of affordances to teacher change	51
5.3.1	Working as a team	52
5.3.2	Planning practices and the role of anticipation	52
5.3.3	Expectations of teachers	53
5.4	Limitations and implications	53
5.5	Opportunities for further research	54
5.6	Conclusions	54
5.6.1	Affordances to teacher change	54
5.6.2	Barriers to teacher change	55
5.7	Summary and concluding thoughts	56
REFERENCES		58
APPENDICES		
Appendix A:	Initial Interview (I#I) questions	66
Appendix B:	Final Interview (I#F) questions	67
Appendix C:	Sample of teacher weekly planning (Phase 1)	69
Appendix D:	Collaborative planning questionnaire (Phase 2)	70
Appendix E:	Lesson sequence and teacher reflective questions	71
Appendix F:	Example of completed planning template	72
Appendix G:	Sample of coding and memoing	74
Appendix H:	Teacher information letter	76
Appendix I:	Example – Task 5, GLoSS Interview 1	78
LIST OF TABLES		
3.1	Summary timeline of data collection	23